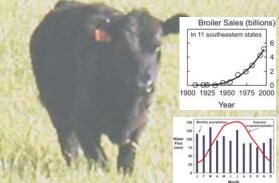


<u>A research project</u> to protect and enhance the Nation's natural resource base and environment by:

- 1 Understanding and quantifying the linkages between soil and water quality
- 2 Relating pasture and cattle productivity to environmental quality
- 3 Disseminating information to producers, extension specialists, policy makers,

and scientists





Hypotheses

- * Soil organic C (SOC) sequestration will be rapid during development (i.e., first 8 years) of tall fescue pastures, because of surface litter accumulation and senescent root deposition.
- * Accumulation of SOC, development of wellaggregated surface soil, and proliferation of a functionally diverse soil microbial community will mitigate the potential for surface water runoff and loss of nutrients from grazed pastures.
- * Broiler litter application will enhance the rate of SOC sequestration in E+ tall fescue more than in E- tall fescue, because higher fertility with broiler litter will increase stocking rate and increase the cycling of C from plants to soil via feces and senescent roots / litter.
- * Significant redistribution of C and other nutrients horizontally within pastures could affect soil physical, chemical, and biological properties that could modify nutrient loss via runoff.
- * By increasing SOC and total N content at the soil surface, grazed pastures will improve water infiltration and reduce water runoff volume and nutrient loss during the majority of the year. Seasonal differences in nutrient runoff will likely occur in the comparison between grazed and hayed systems.
- * A relationship will develop between long-term animal production and environmental quality responses (e.g., SOC sequestration, water runoff, and nutrient runoff).

Objectives

Quantitatively evaluate three management factors

- 1 Tall fescue endophyte association (wild-type E+, novel E+, and E-)
- 2 Fertilizer source (inorganic and broiler litter)
- 3 Harvest management (grazed and hayed)

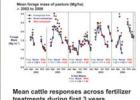


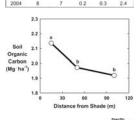
for their impacts on plant and animal productivity, soil quality, and fluxes of potential pollutants to the environment.

Specific objectives include:

- * Measure a suite of soil physical, chemical, and biological properties that could contribute to soil quality assessment in response to management, animal behavior, and landscape characteristics
- * Separate the influences of management, landscape features, and animal behavior on soil components
- * Proportionately attribute the influence of several factors (management, landscape position, animal behavior, soil properties) that contribute to nutrient runoff
- * Integrate soil, water, plant, and animal responses into a recommendation for producers to balance productivity and environmental quality

Some previous results





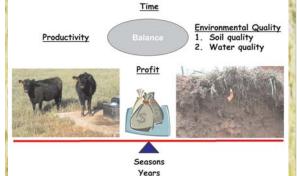
Response Forage mass (Mg/ha)	Inorganic		Broiler Litte
	1.54	ns	1.50
Stocking rate (head/ha)	2.5	ms	2.4
Stocking weight (Mg/ha)	1.05	ns	1.01
Average daily gain (kg/head/day)	0.69	ms	0.67
Total gain (kg/ha/yr)	601	ms	571

2.0

Novel E+

Wild E+

ad/ha)



Response variables

Soil - total organic C-N; particulate organic C-N; microbial biomass C; mineralizable C-N; water-stable aggregate distribution and stability; pH; bulk density; extractable N-P; microbial community structure (PLFA, Biolog); ergosterol; soil-profile inorganic N

Water - runoff volume, N-P, sediment

<u>Plant</u> - botanical composition; hay yield; available forage; endophyte infection

Cattle - weight gain; performance; stocking density

Products so far

Fact sheets Scientific posters Extension bulletin Field day tours







